

**INTRODUCTION**

Glacier Bay, located in southeastern Alaska, was completely ice covered about 100 years ago (Goldthwait, 1963). The retreat of the ice front, accompanied by intrusion of ocean water into the deeply eroded, formerly ice-filled valleys, has resulted in a complex bathymetry. The bay is now a large, deep, ice-free inlet.

This inlet is located in the northeastern corner of Glacier Bay (see index map). This inlet, which was completely filled by Grand Pacific Glacier as late as 1907 (American Geographical Society, 1907), is approximately 10 km long, 2 to 4 km wide, and reaches a maximum depth of about 300 m at its mouth. This inlet may be one of a series planned to illustrate the relation of sediment thickness to flow dynamics in the Glacier Bay system. A second objective of this report is to show characteristic sediment-reflection profiles obtained from 1974 seismic reflection data. The third objective is to provide a brief summary of the depositional processes active in this inlet.

**Geologic Setting**

The bedrock geology of the Glacier Bay area is very complex, including igneous and metamorphic rocks that range in age from early Paleozoic to Mesozoic. The rocks are cut by a complex pattern of faults and folds. The rocks are generally well exposed, but some are covered by glacial till and moraine deposits. The rocks are generally well exposed, but some are covered by glacial till and moraine deposits. The rocks are generally well exposed, but some are covered by glacial till and moraine deposits.

**Glacial History**

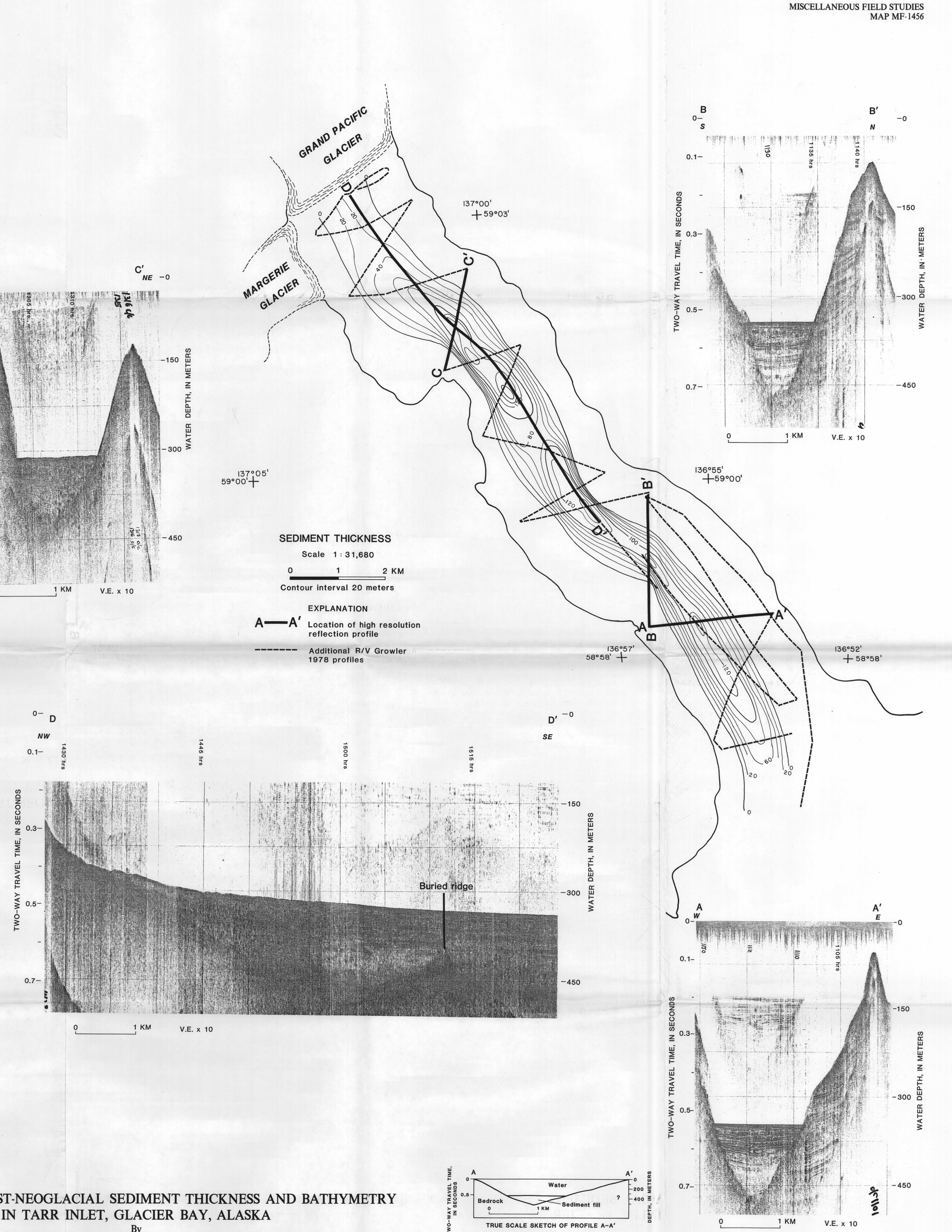
Although the oldest glacial deposits known from Glacier Bay are of late Wisconsin age (older than 12,000 ± 150 years B.P.; McManis and Goldthwait, 1971), glaciers covered much of the eastern half of Alaska as recently as 100 years ago (Clarke and Goldthwait, 1978). The area around the bay was covered by ice from the last glacial maximum (LGM) about 18,000 years ago. The ice was about 100 m thick in the northern part (McManis and Goldthwait, 1971). The ice apparently extended through the strait, into Cross Sound, and onto the continental shelf. According to Goldthwait (1963, p. 37), there followed a proglacial glacial history in Glacier Bay. (1) Retreat of the ice about 11,000 years ago to near its present position; (2) a 5,000-year-long warm period (Optimalism); (3) a lesser glacial advance lasting about 3,000 years (Little Ice Age); and (4) the rapid retreat of the glaciers in the past 200 years.

**Methods**

We conducted a high-resolution seismic-reflection cruise of Glacier Bay on the R/V *Geological Survey* in 1979. On that cruise we ran about 700 km of seismic lines and obtained coverage in most of the inlet (Clarke and others, 1979). The seismic-reflection profiles obtained in this inlet were obtained with a 300-channel analog seismic system. Seismic waves and data were recorded on 100-m-long magnetic tape. The seismic waves were recorded on 100-m-long magnetic tape. The seismic waves were recorded on 100-m-long magnetic tape.

**RESULTS**

The bathymetric map and seismic profiles of this inlet show the thickness of the floor of this large fjord. The axial gradient from glacier front to the mouth is 0.1° to 0.2°. The axial gradient from the first kilometer from the glacier is 0.1° to 0.2° compared to a gradient of 0.05° in the lower half of the fjord. (Note variation in slope along profile 0-1°). The steep bedrock walls of the fjord, above the first kilometer from the glacier, are generally 0.1° to 0.2°. The steep bedrock walls of the fjord, above the first kilometer from the glacier, are generally 0.1° to 0.2°. The steep bedrock walls of the fjord, above the first kilometer from the glacier, are generally 0.1° to 0.2°.



MAPS SHOWING POST-NEOGLACIAL SEDIMENT THICKNESS AND BATHYMETRY  
IN TARR INLET, GLACIER BAY, ALASKA

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